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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the application of:
HUI-JUNG WU, ET AL.

Docket: 30-4540

Serial Number: 09/141,287

Group Art Unit: 2800

Filed: August 27, 1998

Examiner: E. Kielin

For: PROCESS FOR OPTIMIZING MECHNICAL STRENGTH OF
NANOPOROUS SILICA

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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BOARD OF PATENT APPEALS
AND INTERFERENCES

REQUEST FOR RECONSIDERATION OF DECISION ON APPEAL

Sir:

Request is hereby made for the Reconsideration of the Decision by the Board of Patent Appeals mailed February 20, 2004 in the above case. Please consider the following remarks. This request is submitted in triplicate.

Regarding the rejection of claims 1-13 and 16-29 stand rejected under 35 U.S.C. 103 over U.S. patent 5,736,425 to Smith et al. (hereinafter '425) in view of Hawley's Condensed Chemical Dictionary. The Board has agreed with the examiner that the monomethyl ethers used as low volatility solvents according to the present invention are equivalent to the glycols used as low volatility solvents in Smith '425. Appellants again urge that this is incorrect.

For the convenience of the Board, the first claim is rewritten here:

1. A process for forming a nanoporous dielectric coating on a substrate which comprises:





- (a) forming a substantially uniform alkoxysilane gel composition on a surface of a substrate, which alkoxysilane gel composition comprises a combination of at least one alkoxysilane, an organic solvent composition, water, and an optional base catalyst;
wherein the organic solvent composition comprises a relatively high volatility solvent having a boiling point of about 120 °C or less, and a relatively low volatility solvent selected from the group consisting of di(ethylene)glycol monomethyl ether, tri(ethylene)glycol monomethyl ether, tetra(ethylene)glycol monomethyl ether; di(propylene)glycol monomethyl ether, tri(propylene)glycol monomethyl ether, triethylene glycol monomethyl ether, and mixtures thereof;
- (b) heating the substrate for a sufficient time and at a sufficient temperature in an organic solvent vapor atmosphere to thereby condense the gel composition; and then
- (c) curing the gel composition to form a nanoporous dielectric coating on the substrate.

Claims 1-13 and 16-29 stand rejected under 35 U.S.C. 103 over U.S. Patent No. 5,736,425 to Smith et al. (hereinafter '425) in view of Hawley's Condensed Chemical Dictionary. There is no dispute that Smith '425 defines a similar process with the principal difference that Smith requires the use of **glycols** and the instant claims require the presence of a Markush Group of low volatility solvents which are **ethers**. The crux of the examiner's position is that because Appellant's monomethyl **ethers** have a similar boiling point (as shown by Hawley) as the **glycols** of Smith, et al, that the use of Appellants monomethyl ethers would be obvious over the Smith, et al references. The examiner asserts that the monomethyl ethers used as low volatility solvents according to the present invention are *equivalent* to the glycols used as low volatility solvents in Smith '425. Appellants submit that this is incorrect. The examiner thus points to Hawley's to show that the diethylene glycol monomethyl ether used according to the present invention has a boiling point of 194°C and is soluble in water. The Board agrees with the examiner's conclusion that it would have been obvious to use diethylene glycol monomethyl ether in the place

of Smith's glycol solvent, stating that they "have the same properties". Appellants submit that this is not the case. There is no suggestion in the art that glycols "have the same properties" as ethers, and certainly not for this art area. Admittedly, one can go to the Hawley's reference and find glycols which have a single parameter, i.e. a boiling point, which are in the range of the instant ethers. However, this does not render them equivalent for this application. Indeed, one could probably find a whole array of solvents. Perhaps ketones or esters, which have a similar boiling point range, and that does not *per se* mean that they are thereby suggested to be useful for this application.

While the glycols of Smith may have a single parameter in common with the instant ethers, i.e. boiling point, this is legally insufficient to equate the two different classes of compounds. Smith does not suggest that they are equally useful in his invention. Indeed, Smith does not even mention ethers. The examiner is not entitled to presume that they are equally useful in this application unless there is something to suggest such from the art.

The most fundamental difference is that di(ethylene)glycol monomethyl ether and the other solvents recited by claim 1 are **ethers**, thus placing them into a completely different class of compounds than the **glycols** or simple alcohols of the Smith, et al patent. In addition, the monomethyl ethers as recited by claim 1 have only a single alcohol functional group, in contrast to the double-alcohol or diol functional groups found in the glycols of the Smith, et al patent. In order to better appreciate the structural differences between di(ethylene)glycol monomethyl ether and the other monomethyl ethers required by claim 1, and the glycol solvents described by the '425 patent, Table 1 is provided.

TABLE 1	
Compound	Formula
di(ethylene)glycol monomethyl ether	
ethylene glycol	
1,4 butylene glycol extra carbon	
1,5 pentanediol	

Other monomethyl ethers as recited by claim 1 are similar to di(ethylene)glycol monomethyl ether, and are set forth in Table 2, below, for convenience.

TABLE 2	
Compound	Formula
tri(ethylene)glycol monomethyl ether	$\text{CH}_3(\text{OCH}_2\text{CH}_2)_3\text{OH}$
tetra(ethylene)glycol monomethyl ether	$\text{CH}_3(\text{OCH}_2\text{CH}_2)_4\text{OH}$
di(propylene)glycol monomethyl ether	$\text{CH}_3(\text{OCH}_2\text{CH}_2\text{CH}_2)_2\text{OH}$
tri(propylene)glycol monomethyl ether	$\text{CH}_3(\text{OCH}_2\text{CH}_2\text{CH}_2)_3\text{OH}$

Of course, the ethers have an oxygen atom between alkyl groups while the glycols do not. This demonstrates that the two families of compounds are not analogs, homologs or isomers of one another and hence, one groups does not suggest the other. The burden is therefore upon the examiner to provide art which shows that the ethers are equivalent to the glycols within this context. This has not been done other than to show one overlapping parameter, i.e. a boiling point.

The fact that Hawley's lists diethylene glycol monomethyl ether as having a boiling point of 194°C does not give any suggestion or motivation *per se* which would lead one skilled in the art to formulate the present invention upon reading Smith '425. Appellants urge that the similarity of boiling points between the solvents of the present invention with those of Smith '425 **does not qualify as an adequate suggestion** or motivation by the cited reference.

It is urged that major differences exist between ethers and glycols, which would motivate those skilled in the art to *not* substitute the glycols of Smith with the ethers of the present invention. First, it is urged that there is no structural similarity between ethers and glycols whatsoever. Ethers have the structure R-O-R. The monomethyl ethers of the present invention have better stability because they have only a single -OH group. In contrast, the glycols taught by Smith have a structure which includes an R group with two or more -OH groups, which are known to tend to form an undesirable bridging species. Appellants urge that the ethers of the present invention are structurally distinct from any compound disclosed or suggested by Smith. It has been held that even a known chemical relationship between structurally similar compounds does not support a finding of prima facie obviousness. See *In re Grose*, 592 F.2d 1161, 201 USPQ 57 (CCPA 1979) (Court held that different crystal forms of zeolites would not have been structurally obvious one from the other because there was no chemical theory supporting such a conclusion. The known chemical relationship between structurally similar compounds (homologs, analogs, isomers) did not support a finding of prima facie obviousness of claimed zeolite over the prior art. Regarding the present case, these compounds are very different chemical entities which are not even analogs, homologs, or isomers of one another. It is urged that ethers and glycols are *not of the same class of compounds* whatsoever, and there is no teaching in the art which would lead one skilled in the art to determine that a monomethyl ether should or could be substituted for a glycol under the present circumstances.

Next, the Board takes the position that these materials have *similar properties*. In fact, on page 5 of their Decision mailed February 20, 2004, the Board states that the diethylene

glycol monomethyl ether and Smith's glycols "have the same properties". However, it is urged that no proof has been offered as to any similarity of properties except for a similarity of boiling points and solubility in water. Boiling point and water miscibility similarities **alone are not enough** to show that they "have the same properties" or that they should be or could be substituted for each other. It is thus urged that this is an insufficient showing to obviate the present invention.

The Board goes on to assert that some ethers are *derived from* ethylene glycol. Appellants respectfully urge that simply because some ethers may be derived from ethylene glycol *does not* mean that ethers have properties which are similar enough to glycols that they would be substitutable for one another. Analogously, an array of pharmaceuticals are *derived from* crude oil. Derivation is not a sufficient suggestion.

In conclusion, the Smith patent only teaches ethylene glycol, and they do not teach or suggest the use of a monomethyl ether. The examiner seeks to fill this gap by a showing from Hawley that diethylene glycol monomethyl ether has a boiling point of 194 ° C. However, the fact that ethylene glycol and diethylene glycol monomethyl ether may have similar boiling points and water miscibility is insufficient to suggest that ethylene glycol may be substituted by diethylene glycol monomethyl ether. They are very different chemical entities which are not analogs, homologs or isomers of one another and the use of one does not suggest the use of the other to one skilled in the art. For these and the above stated reasons, it is urged that the 35 U.S.C. 103 rejection is improper and should be overruled.

The Board has affirmed the examiner's rejection of claims 1-13 and 16-29 for obviousness type double patenting over Smith I or Smith II in view of Hawley. It is submitted that this ground of rejection is improper. Neither Smith I nor Smith II claim a method wherein the alkoxysilane composition contains a monomethyl ether. The claims of the '425 patent require a solvent which is ethylene glycol, 1,4-butylene glycol or 1,5-pentanediol. U.S. 5,807,607 requires a solvent which is a polyol, specifically glycerol. These are not monomethyl ethers and such polyols and monomethyl ethers are not

analogous, homologous nor isomers and are therefore not suggestive of one another. For the reasons discussed above, it is submitted that this ground of rejection should be rescinded.

The Board has entered new grounds of rejection against claims 3, 16, and 20 under 35 U.S.C. 112, second paragraph, as being indefinite.

Regarding claim 3, the Board states that the low volatility solvent materials of claim 3 must be limited to the list of low volatility solvent materials of claim 1, since claim 1 includes the phrase "selected from the group *consisting of*". However, Applicants respectfully point out that the materials shown in claim 1 relate to a list of low volatility solvents for the organic solvent composition, while the materials shown in claim 3 relate to a list of low volatility solvents for the organic solvent vapor atmosphere of step (b) in which the substrate of claim 1 is to be heated to thereby condense the gel composition. It is urged that claim 3's list of low volatility solvent materials for the *atmosphere* should not be limited, to nor confused with, those materials listed in claim 1 for the *composition*.

Regarding claim 16, the Board points out that this claim depends from cancelled claim 14. This claim is now the subject of the enclosed amendment and now depends from claim 1. The Board further states that this claim expands the scope of the group of low volatility solvents listed in claim 1. Accordingly, this claim has been amended to now read "wherein the alkoxysilane gel composition further comprises an alcohol or a polyol".

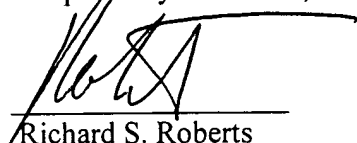
Regarding claim 20, the Board states that this claim expands the scope of the group of organic solvents listed in claim 1. It is submitted that the rejection is improper since as long as a relatively low volatility solvent selected from the group consisting of di(ethylene)glycol monomethyl ether, tri(ethylene)glycol monomethyl ether, tetra(ethylene)glycol monomethyl ether; di(propylene)glycol monomethyl ether, tri(propylene)glycol monomethyl ether, triethylene glycol monomethyl ether, and mixtures thereof is present at a minimum, other solvents may also be present. The Smith

reference does not suggest the presence of one of these ethers. The amendment does correct lines 5- such that the term 1,4,1,4-butanediol now reads "1,4,-butanediol".

For these reasons, it is respectfully urged that the 35 U.S.C. 112 rejections are overcome and should be withdrawn.

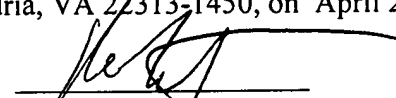
Appellants respectfully submit that the above stated prior art rejections should be overruled.

Respectfully submitted,



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Date: April 20, 2004

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage pre-paid in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on April 20, 2004.



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